

III. REMARKS

A. Brief Summary of the Pending Claims

When the Office action was issued, claims 1, 10, and 15-27 were pending in the application. The Office action rejected claims 1, 10, and 15-27 under 35 U.S.C. § 103(a).

The above amendment does not cancel or add any claims. Thus, after the above amendment is entered, claims 1, 10, and 15-27 will remain pending in the application.

B. Rejection of Claims 1, 15, and 16 Under 35 U.S.C. § 103(a)

Claim 1 is an independent claim and claims 15 and 16 depend from claim 1. The Office action rejected claims 1, 15, and 16 under 35 U.S.C. § 103(a) for allegedly being obvious in view of U.S. Patent No. 6,132,012 to Ishii (“the Ishii patent”) and U.S. Patent No. 6,669,311 to Holst et al. (“the Holst patent”). Applicant respectfully submits that the rejection of these claims was incorrect for the following reasons.

Claim 1 recites:

a pressure detection device which measures the pressure of the hydraulic braking fluid in the accumulator and responsively produces producing an output signal;

a monitoring device which receives the output signal; and
wherein the monitoring device uses being capable of using the output signal to determine the accumulator charge pressure

In order for the invention of claim 1 to be obvious, the prior art must disclose each of the recited elements. Before a comparison between the elements of claim 1 and the prior art can be made, the elements of the claim must be constructed and interpreted. In this application, the term “accumulator charge pressure” has been defined as the pre-charge gas

pressure in a gas accumulator. *See* paragraph 3 of the specification. In this art, it is understood as the pressure of the gas that is contained in the gas side of the accumulator when the pressure on the hydraulic side of the accumulator is at atmospheric pressure.

Neither the Ishii patent nor the Holst patent describes, suggests, or even discusses determining a pre-charge gas pressure in a gas accumulator.

The Office action alleges that the Ishii patent describes a determination of the pre-charge gas pressure in a gas accumulator. *See* page 2 of the Office action. The Office action cites to columns 8 and 9 of the Ishii patent in support of this allegation. Columns 8 and 9 contain a description of pressure gradient calculating means 21, its function, and purpose. As more fully described below, pressure gradient calculating means 21 is used to measure a pressure rise gradient and a pressure decay gradient in the hydraulic brake boost circuit to detect fault conditions. None of these measurements, however, involves measuring the pre-charge gas pressure in a gas accumulator.

The Ishii patent describes a process where the rate of pressure increase in the brake boost system hydraulic fluid is measured during operation of the pump. This is described as the “gradient of rise in the pressure.” Column 8, lines 65-66. The Ishii patent describes the calculation of this pressure gradient in the calculating means 21 by measuring pressures at fixed time intervals. *See* column 8, lines 64-66. After the pressure gradient is determined, a pressure gradient comparison means 24 compares the calculated pressure gradient to a set value α . *See* column 8, lines 36-39, and column 9, lines 2-4. If the calculated pressure gradient is less than α (if the pressure is not rising as rapidly as it normally should), a fault is assumed and counted. If the fault occurs sequentially a predetermined number of times, a fault signal is given to the operator. *See* column 9, lines 6-10.

The Ishii patent also describes a process where the rate of pressure decay in the brake boost system hydraulic fluid is measured. This is described as the “gradient of pressure depression.” Column 9, lines 13-14. Although not specifically described, presumably this pressure gradient is to be calculated in the calculating means 21 by the same manner as before—by measuring pressures at fixed time intervals. After the pressure

gradient is determined, the pressure gradient comparison means 24 compares the calculated pressure gradient to a set value β . *See* column 9, lines 17-18. If the calculated pressure gradient is greater than β (if the rate of decay is greater than a normal level), a fault is assumed and counted. If the fault occurs sequentially a predetermined number of times, a fault signal is given to the operator. *See* column 9, lines 22-25.

In the Ishii patent, neither the measurement of the pressure rise gradient nor the measurement of the pressure decay gradient involves measuring the pre-charge gas pressure in the gas accumulator 7. Measuring two hydraulic fluid pressures on the hydraulic fluid side of the accumulator at a fixed time interval, and subtracting the two pressures does not yield the pre-charge gas pressure. Suppose, for example, that in a system such as that illustrated in FIG. 1 of the Ishii patent, the actual pre-charge gas pressure of accumulator 7 is 180 psi, while the specification for the pre-charge pressure is 200 psi. During operation of the system, suppose further that the cut-in pressure is 250 psi, and cut out pressure is 300 psi. The pump 8 should turn on when the pressure of the hydraulic fluid drops below 250 psi, and turn off when the pressure rises above 300 psi. During operation of the pump, the calculating means 21 may determine the gradient of pressure rise to be 10 psi /sec. If the minimum acceptable gradient for that particular pressure, α , is 8 psi /sec, the system will not produce a fault. Calculation of the gradient of pressure rise does not tell the system or the operator that the pre-charge pressure is 180 psi, or that the pre-charge pressure is below specification. Measuring fluid pressures between 250 psi and 300 psi does not reveal that the accumulator pre-charge gas pressure is 180 psi.

A fault in the system described in the Ishii patent could signal a leaking hose, a bad pump, or many other conditions, including a bad accumulator. One of the purposes of this invention is to better diagnose faults to determine when the accumulator is faulty as opposed to other parts of the braking system. *See* paragraph 5 of the specification.

In the present application, the determination of the pre-charge gas pressure in a gas accumulator is accomplished by taking several measurements of the hydraulic fluid pressure in the hydraulic circuit after engine start-up, then comparing those several

measurements to determine which one is the most representative of the pre-charge gas pressure. Other possible methods are also described and claimed.

A review of the Holst patent reveals that it, too, does not disclose, suggest, or even mention the determination of a pre-charge gas pressure in a gas accumulator.

Because neither the Ishii patent nor the Holst patent contains a disclosure or teaching of determining a pre-charge gas pressure in a gas accumulator, the rejection of claim 1 as obvious was incorrect and should be withdrawn.

Claim 15 depends from claim 1 and the rejection of claim 15 was incorrect for the same reasons. In addition, claim 15 recites additional elements which are not found in the Ishii and Holst patents.

Claim 1 recites that a monitoring device receives the pressure of the hydraulic braking fluid, and claim 15 further recites that “the monitoring device records the pressure of the hydraulic braking fluid in the accumulator within a fixed amount of time after a braking system start-up is detected.” The Office action alleges that this further limitation is “an obvious alternative equivalent means....” However, the Office action does not put forth any facts or specific reasons to show why this further limitation is obvious other than to point out that the system in the Ishii patent begins operation when the ignition switch is turned on. Similarly, claim 16 recites the determination of a cut-in pressure and a cut-out pressure, neither of which is addressed in the Office action. It is respectfully submitted that a *prima facie* case of obviousness for claims 15 and 16 has not been met in the Office action. The applicant has not been given any information about the reasons for the examiner’s belief that these claims are obvious to permit rebuttal arguments. These claims have simply been summarily dismissed in the Office action as allegedly obvious. Such a rejection is improper and should be withdrawn or further explained.

C. Rejection of Claims 10 and 17-20 Under 35 U.S.C. § 103(a)

The Office action rejected claims 10 and 17-20 under 35 U.S.C. § 103(a) for allegedly being obvious in view of the Ishii patent and the Holst patent.

Claim 10 is an independent claim and claims 17-20 depend from claim 10.

Claim 10 recites:

measuring the pressure of the hydraulic braking fluid and
responsively producing an output signal;
processing the output signal to estimate an accumulator charge
pressure; and
comparing the estimate of the accumulator charge pressure with an
ideal value.

As described above with respect to claim 1, neither the Ishii patent nor the Holst patent discloses estimating a pre-charge pressure in a gas accumulator. Thus, the rejection of claim 10 was incorrect and should be withdrawn.

The rejection of dependent claims 17-20 was also incorrect for at least this reason and should be withdrawn. Claims 17-20 also recite additional limitations which are not found in the prior art. For example, claim 19 recites “comparing several hydraulic braking fluid pressures and determining which one is the best estimate of the accumulator charge pressure.” The Office action does not explain where this limitation is disclosed in the Ishii or Holst patents.

D. Rejection of Claims 21-24 Under 35 U.S.C. § 103(a)

The Office action rejected claims 21-24 under 35 U.S.C. § 103(a) for allegedly being obvious in view of the Ishii patent and the Holst patent. Applicant respectfully submits that the rejection of these claims was incorrect for the following reasons.

Claim 21 is an independent claim and claims 22-24 depend from claim 21.

Claim 21 recites:

... the accumulator comprising at least a first chamber for hydraulic fluid which has a first volume when the hydraulic fluid is less than a first pressure,

and which expands to a volume greater than the first volume when the hydraulic fluid is greater than the first pressure;

...

a monitoring device which receives the output signal of the pressure detection device, wherein the monitoring device identifies an estimate of the first pressure of the hydraulic fluid, and uses the estimate of the first pressure in determining whether to produce a fault signal.

Claim 21 recites a “first hydraulic braking fluid pressure” and defines this limitation in the claim itself. According to the claim, the “first hydraulic braking fluid” is the pressure at which the first chamber expands to a volume greater than its initial volume. Claim 21 also recites that a monitoring device receives the pressure of the hydraulic fluid in the first chamber and uses that pressure signal to identify an estimate of the first pressure.

Neither the Ishii patent nor the Holst patent discloses or suggests these limitations in claim 21. The pressure gradient rise and pressure gradient decay measurements were alleged in the Office action to comprise these limitations. See Office action, page 2. As explained above, neither of these measurements can reveal the “first hydraulic braking fluid pressure” as defined in claim 21. For at least this reason, the rejection of claim 21 was incorrect and should be withdrawn.

The rejection of claims 22-24 was incorrect for at least the same reasons and should be withdrawn. Also, claims 22-24 contain additional limitations which are not disclosed or suggested in the Ishii or Holst patents.

E. Rejection of Claims 25-27 Under 35 U.S.C. § 103(a)

The Office action rejected claims 25-27 under 35 U.S.C. § 103(a) for allegedly being obvious in view of the Ishii patent and the Holst patent. Applicant respectfully submits that the rejection of these claims was incorrect for the following reasons.

Claim 25 is an independent claim and claims 26 and 27 depend from claim 25.

Claim 25 recites:

a monitoring device for receiving the output signal of the pressure detection device, wherein the monitoring device samples one of the pressure of the hydraulic braking fluid in the first chamber of the accumulator, or the pressure of the precharge gas in the second chamber of the accumulator, in response to a detection of a braking system start-up, and uses the one of the sample of the hydraulic braking fluid pressure or the precharge gas pressure in determining whether to produce a fault signal.

Neither the Ishii patent nor the Holst patent teaches or suggests sampling the hydraulic fluid pressure upon the detection of a braking system start-up, as recited, and using the sample to generate a fault signal. For at least this reason, the rejection of claim 25 was incorrect and should be withdrawn.

The rejection of claims 26 and 27 was incorrect for at least the same reasons. Also, claims 26 and 27 include additional limitations which are not found in the Ishii or Holst patents.

F. Conclusion

The Office action set a shortened statutory three month reply period expiring on January 19, 2005. A petition for a three month extension of time is submitted herewith to extend the reply period to April 19, 2005. An RCE is also submitted herewith. The fees for the petition and the RCE, as well as any other fees necessary during the prosecution of this application now or in the future, should be charged to the undersigned's deposit account no. 03-1129, as indicated on the accompanying fee sheet.

If any issues remain to be resolved in the application, the examiner is encouraged to telephone the undersigned representative.

Respectfully submitted,



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